ELECTROSTATICS AND MAGNETISM.

A Text-book of Physics. By Prof. J. H. Poynting and Sir J. J. Thomson. *Electricity and Magnetism.* Parts i. and ii. *Static Electricity and Magnetism.* Pp. xiv + 345. (London: Charles Griffin and Co., Ltd., 1914.) Price 10*s.* 6*d.*

THE late Prof. Poynting's qualities as a physicist are reflected in the volume on electrostatics and magnetism now before us, for he was always distinguished by soundness and clearness of thought, and care and accuracy of experiment rather than by showy brilliance. The book is very clearly written, and evidently no trouble was spared in the attempt to make it as easily understood as possible. A large part of it is, in fact, a model of exposition, and could scarcely be improved upon. The chief value of the book, however, lies in the fact that it goes a little farther than the ordinary elementary text-book has done up to the present. Most English text-books deal in a very cursory way with both electrostatics and magnetism, and it is extremely useful to have a book which gives a somewhat more adequate treatment without at the same time becoming too difficult and exhaustive.

The chapters on "The Dielectric," "Specific Inductive Capacity," "Stresses in the Dielectric," "Alterations in the Dielectric," and "Pyro-electricity and Piezo-electricity," are particularly good in the "Electrostatics"; and those on "Forces on Magnetised Bodies," "Paramagnetic and Diamagnetic Substances," and "Magnetism and Light" in the "Magnetism." The simple statement of the titles of these chapters will give a clue to the difference between this text-book and others. All the extra matter is quite important, and in no way abstruse, yet a considerable part of it is not to be found in any other English elementary text-book. The great value of the book to students is therefore obvious, and is scarcely lessened by the few defects which exist.

The first and most serious of the faults of the book is the inconsistency with which previous knowledge in the student is assumed. The first chapters in both the electrostatics and the magnetism are written as if for students with absolutely no previous knowledge of the subjects, while to understand the chapters on magnetic induction a student would require a reasonable knowledge of the magnetic field due to a current. In a book of this character it would seem that the most reasonable assumption to make is that the knowledge of the student is of about the intermediate science standard. The extremely elementary general accounts of the common phenomena could thus be omitted, and one could start without any preamble on the more important part of the book.

The order in which the various divisions of the subject are taken is rather strange in places. It seems the reversal of the proper order to give a number of the consequences of an inverse square law of force in one chapter and to give the experimental proof of the law in the following chapter, but the most flagrant case is the attempt to give a general account of susceptibility, permeability, and the hysteresis loop before any of the magnetic quantities have been defined. To an elementary student these things would be very confusing, but as there is no doubt that all students who come to this book will bring with them a fair working knowledge of the most elementary parts of the subject, very little harm will be done.

A few not unimportant matters of detail might also be improved. There are two totally different definitions of quantity of electricity, one on p. 29 and one on p. 67. It is true that these two are consistent with one another, but this is not proved, and the first definition is quite unnecessary and is nowhere used. The definition on p. 42 of the electric potential at a point as $\frac{\Sigma Q}{r}$ seems to be converting potential into a mathematical symbol with no direct physical meaning. If we define the difference of potential between two points as V when the work done in taking an indefinitely small quantity dq from one point to the other is $V.dq$, we not only have the physical conception of work per unit quantity but we can also define any other kind of potential in an exactly similar way.

It is also desirable that Franklin's jar with its movable coatings should be given a long-deserved rest. It does not prove, what it was originally supposed to prove, that the seat of electrical action is in the dielectric; it merely proves that glass is a very bad substance to use as an insulator, because it so readily forms a conducting layer on its surface by the absorption of moisture from the atmosphere. A Franklin's jar made with a good insulator does not work, and therefore there seem to be no reasons for introducing it.

Most of the diagrams are very clear and suitable; they are of good size and are simplified as much as possible. But Fig. 194 on p. 250 offends the eye of a physicist just as keenly as a note badly out of tune offends the ear of a musician. One scarcely expects all the diagrams of lines of force and equipotential surfaces to be drawn accurately to scale, but one does demand that lines of force and equipotential surfaces shall not be palpably inclined to one another as they are

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in this diagram. This certainly should be altered before a new edition is printed.

Although it takes a good deal of space to point out these defects, they are not numerous or important enough to decrease the value of the book sensibly. It is scarcely necessary to advise students to get the volume, as they will find it indispensable if they wish to obtain a good working knowledge of the fundamentals of electrostatics and magnetism. P. P.

BOTANY AND NATURE STUDY.

(1) *Introduction to Botany.* By J. Y. Bergen and Prof. O. W. Caldwell. Pp. vii+368. (Boston and London: Ginn and Co., n.d.) Price 5*s*.

(2) *A Flora of Norfolk.* Edited by W. A. Nicholson. Pp. vii+214+2 maps. (London: West, Newman and Co., 1914.) Price 6*s*.

(3) and (4) *Wild Flowers as They Grow.* Photographed in colour direct from nature by H. Essenhigh Corke. With descriptive text by G. Clarke Nuttall. Sixth series. Pp. viii+200 +plates. Seventh series. Pp. viii+204+ plates. (London: Cassell and Co., Ltd., 1914.) Price 5*s*. net each.

(5) *The English Year: Spring.* By W. B. Thomas and A. K. Collett. Pp. ix+334+ plates. (London and Edinburgh: T. C. and E. C. Jack, n.d.) Price 10*s*. 6*d*. net.

(6) *My Garden in Spring.* By E. A. Bowles. Pp. xx+308+plates. (London and Edinburgh: T. C. and E. C. Jack, 1914.) Price 5*s*. net.

(1) THE authors of this excellent elementary text are practised hands in the production of books on botany for students, and the present work is mainly a condensation of their larger work published a few years ago, entitled "Practical Botany," though from the abbreviated list of their works on the title-page one might infer that *each* author had published an earlier book with this name. However, it differs considerably in style from the authors' previous works, and indeed from most other elementary books on botany, in two features which are consistently kept in view throughout—namely, the emphasis which is laid on the dynamic side of botany, the plant being regarded as an organism forced to maintain its existence under conditions sometimes favourable and sometimes unfavourable to it, and the constant reference to the practical side of plant life in all its bearings. That is, while the work gives a good general grounding in botany, the ecological and the economic aspects of the subject, taken in the widest sense, are never lost sight of and at the same time are not unduly stressed. Since there are comparatively few references to plants unknown in the wild state or unfamiliar in cultivation in Britain, the book is one that can be warmly commended to teachers, at any rate to those who have no set syllabus to work from, while those responsible for the framing of syllabuses in elementary botany might learn much from a book like this as to what is wanted in the case of a subject with such marked educational significance. The book is generously illustrated, and the figures are remarkably clear and well executed.

(2) The Norfolk and Norwich Naturalists' Society is to be congratulated on the production of this admirable flora of a remarkably interesting county, a book which was certainly required, considering that the only previously published Flora appeared so far back as 1866 and has long been out of print. The editor of this work has left no stone unturned in his efforts to make the lists of the flowering plants and the higher flowerless plants of Norfolk as complete as possible, while he has enlisted the services of other writers in the earlier part of the book, dealing with climate, soils, physiography, and plant distribution, which precedes the plant lists. Both sections of the book are, however, open to a certain amount of criticism. While the articles on climate and on soils are all that could be desired, being admirably clear though brief, that on physiography and plant distribution is rather weak as regards the latter or vegetational aspect, though the part dealing with physiography is good so far as it goes. The author of what ought to be the most important portion of the general discussion of the flora of a county or other area fails to arrange his subject-matter clearly and logically, and his treatment of the ecology and distribution of the flora will, we fear, be useful neither to the average field botanist unfamiliar with the terminology or the ideas of modern ecological plant-geography, nor to the ecologist desiring to compare the vegetation of Norfolk with that of other parts of the country which have been systematically investigated from this point of view. In a flora of this kind, the general account of the vegetation should be preceded by an outline of general ecological principles, with an indication of the relations of the plant-communities represented in the area to the general scheme upon which these communities are based and classified. Again, in the systematic portion of the work, following on the flowering plants, we find the heading "Cryptogamia," but the list of flowerless plants stops short with the mosses and liverworts; either such a heading

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